

ZAAMN-A

TEST SET, COMBINATION

**1. GENERAL.** This procurement requires a solid-state combination test set that consists of a signal generator, a time-mark generator, and a calibration generator.

**2. CLASSIFICATION.** The equipment shall be Type II, Class 5, Style E, and Color R for Navy applications in accordance with MIL-T-28800.

**3. OPERATIONAL REQUIREMENTS.** The equipment shall meet or exceed all of the specifications listed below. Unless otherwise indicated, the terminated signal conditions are for a nominal 50 ohm termination. A modular configuration consisting of a mainframe and three plug-ins for the three generators will be considered acceptable for this application.

**3.1 Signal-generator.** The signal generator shall meet the specifications set forth below.

**3.1.1 Frequency-range.** The frequency range shall be continuously variable from 250 kHz or less to at least 250 MHz.

**3.1.2 Reference-frequency.** The equipment shall be provided with a reference frequency output, typically 50 kHz.

**3.1.3 Frequency-indicator.** The frequency indicator shall be an electronic digital display of at least three digits.

**3.1.4 Frequency-accuracy.** The frequency output accuracy shall be within  $\pm 0.7$  of the least significant digit of the frequency read-out.

**3.1.5 Amplitude-range.** The terminated amplitude range shall be continuously variable from 5 mV or less to at least 5.5V peak-to-peak.

**3.1.6 Amplitude-accuracy.** The accuracy of the indicated amplitude, when measured at the reference frequency output, shall be within  $\pm 5\%$ .

**3.1.7 Flatness.** The output amplitude when referenced to 50 kHz shall not vary more than  $\pm 1\%$  over the frequency range of 250 kHz to 100 MHz and shall not vary more than  $\pm 3\%$  over the frequency range of 100 to 250 MHz.

**3.1.8 Harmonic-content.** The second harmonic shall be at least 35 dB down from the carrier. The third and all higher harmonics shall be at least 40 dB down from the carrier.

**3.2 Time-mark-generator.** The time-mark generator shall meet the following specifications.

**3.2.1 Marker-period.** The equipment shall be provided with selectable marker periods of 1 ns or less to at least 5s in a 1,2,5 sequence.

**3.2.2 Marker-amplitude.** The equipment shall provide at least 1V peak amplitude for the 10 ns through 5s markers, at least 750 mV peak-to-peak for the 5 ns and 2 ns markers and at least 200 mV peak-to-peak for 1 ns markers.

**3.2.3 Trigger-signal.** The equipment shall be provided with a trigger signal that is slaved to the markers for the 100 ns to 5s markers. For marker periods faster than 100 ns the trigger signal shall remain at 100 ns.

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**3.2.4 Time-base.** The equipment's internal time base shall meet or exceed the following specifications.

**3.2.4.1 Accuracy.** The time base shall be accurate to within 0.1 ppm of the internal standard frequency following calibration.

**3.2.4.2 Stability.** The time base stability shall remain within 10 ppm throughout the temperature range of 0 to 50°C after a warmup time not to exceed 0.5 hours.

**3.2.4.3 Aging.** The aging rate of the time base shall not exceed 10 ppm per month.

**3.2.5 Reference-input.** An external TTL-compatible reference input shall be provided. The reference input shall accommodate frequencies of 1, 5, or 10 MHz.

**3.2.6 Variable-timing.** The equipment shall be provided with a vernier control that varies the selected period of the markers by  $\pm 7.5\%$ . A corresponding display shall indicate the variation to within  $\pm 0.1\%$ .

**3.3 Calibration-generator.** The calibration generator shall be provided with a fixed frequency calibrator mode, a high amplitude pulse mode and fast rise pulse modes of operation in accordance with the following specifications. For both pulse modes, the duty cycle shall be 50% nominal.

**3.3.1 Calibrator-mode.** In the calibrator mode, the generator's frequency shall be fixed at 1 kHz nominal.

**3.3.1.1 Amplitude.** When calibrated into 1 megohm, the signal amplitude shall be selectable from 200V peak-to-peak or less to at least 100V peak-to-peak in 1,2,5 sequence. The terminated amplitude shall be 100V or less to at least 5V.

**3.3.1.2 Accuracy.** The accuracy of the signal amplitude shall be within  $\pm 0.25\%$ .

**3.3.1.3 Variable-amplitude.** A vernier control shall be provided that varies the selected amplitude by  $\pm 7.5\%$ . A corresponding display shall indicate the variation to within  $\pm 0.1\%$ .

**3.3.2 High-amplitude-pulse-mode.** In the high amplitude pulse mode, the generator's period shall be selectable in decade steps from 1 s or less to at least 10 ms. The accuracy of the period shall be within  $\pm 5\%$ . A variable control that continuously varies the period between steps and extends the longest period to at least 100 ms shall be provided.

**3.3.2.1 Risettime.** The unterminated risetime shall be 100 ns or less. The terminated risetime shall be 10 ns or less.

**3.3.2.2 Amplitude-range.** The unterminated amplitude shall be continuously variable from 6V or less to at least 60V. The terminated amplitude shall be variable from 0.5V or less to at least 5V.

**3.3.2.3 Aberrations.** Aberrations on the leading edge of the pulse shall not exceed the greater of  $\pm 2\%$  or  $\pm 50$  mV peak-to-peak.

**3.3.2.4 Source.** The equipment shall provide a 600 ohm  $\pm 5\%$  source impedance.

**3.3.2.5 Polarity.** The output pulse shall be positive going from a negative potential to ground.

**3.3.3 Fast-rise-pulse-mode.** When in the fast rise mode, the period shall be the same as for the high amplitude mode (see 3.3.2).

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**3.3.3.1 Risetime.** The terminated risetime shall be 1 ns or less.

**3.3.3.2 Amplitude-range.** The amplitude range shall be continuously variable from 100 mV or less to at least 1V.

**3.3.3.3 Aberrations.** Aberrations on the leading edge shall be within 2% or 10 mV peak-to-peak, whichever is greater, during the first 10 ns. Top variations shall be within  $\pm 0.5\%$  after the first 10 ns.

**3.3.3.4 Polarity.** Separate positive and negative going polarities shall be provided.

**3.3.3.5 Source.** The equipment shall provide a 50 ohm  $\pm 3\%$  source impedance.

**3.3.3.6 Trigger-output.** A terminated trigger output shall be provided. The trigger signal shall be a positive going 1V peak-to-peak pulse.

**3.4 Connectors.** All equipment connectors shall be of the BNC type.

#### **4. GENERAL REQUIREMENTS.**

**4.1 Power source.** MIL-T-28800 nominal power requirements are invoked. Maximum power consumption: 40W.

**4.2 Weight.** 20 kg (44 lb) maximum.

**4.3 Lithium batteries.** Per MIL-T-28800, lithium batteries are prohibited without prior authorization. A request for approval for the use of lithium batteries, including those encapsulated in integrated circuits, shall be submitted to the procuring activity at the time of submission of proposals. Approval shall apply only to the specific model proposed.